

PUBLIC

WESM Manual

Protocol for Central Scheduling and Dispatch of Energy and Contracted Reserves Issue 1.0

Abstract	This document describes the processes involved in the central scheduling of energy and reserve capacities through the WESM
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Document Approval

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Reference Documents

Document ID	Document Title
DOE Department Circular No. 2014-12-0022 (02 December 2014)	"Promulgating the Protocol for the Central Scheduling and Dispatch of Energy and Contracted Reserves in Preparation for the Commercial Operation of the Wholesale Electricity Spot Market (WESM) Reserve Market"
DOE Department Circular No. 2015-11-0018 (12 November 2015)	"Declaring the Commercial Operation of the Central Scheduling and Dispatch of Energy and Contracted Reserves in the Wholesale Electricity Spot Market and Further



Protocol for Central Scheduling and Dispatch of Energy
and Contracted Reserves

WESM-PCSD-001

Document ID	Document Title
	Amendments to its Protocol in Preparation for the Eventual Commercial Operation of the WESM Reserve Market”
	WESM Rules
WESM-CVC	WESM Manual on Constraint Violation Coefficient and Pricing Re-runs
WESM-DPM	WESM Dispatch Protocol Manual

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SECTION 1 INTRODUCTION

1.1 BACKGROUND

1.1.1 On 26 March 2013, the Department of Energy (DOE) issued DOE Department Circular DC2014-03-0009 entitled "Declaring a New Commercial Launch Date for the Wholesale Electricity Spot Market (WESM) *Reserve Market* and Directing a Central Scheduling and Dispatch of Energy and Contracted *Reserves*". The DOE DC2014-03-0009 sets forth the following directives:

- (a) A central scheduling and dispatch of energy and contracted *reserve* capacities for WESM shall be in effect as part of the trial operations in order for the DOE to monitor all available generation capacity in both energy and *reserve*, and to prepare the participants for the eventual commercial operation of the WESM *Reserve Market*.
- (b) The National Grid Corporation of the Philippines (NGCP) and the Philippine Electricity Market Corporation (PEMC) are hereby directed to convene and formulate the Central Scheduling and Dispatch of *Reserves* Protocol (The Protocol).

1.1.2 WESM Rules Clause 3.3.1.2 states that ancillary services may include the following without limitation

- (a) The provision of sufficient *regulating reserve* to meet the fluctuations in load occurring within a trading interval
- (b) The provision of sufficient *contingency reserve* to maintain power system frequency
- (c) The provision of *dispatchable reserve* available to respond to a re-dispatch performed during a trading interval, on either a regular or an ad hoc basis;
- (d) The provision of reactive support to guard against power system failure; and
- (e) The provision of black start capability to allow restoration of power system operation after a complete failure of the power system or part of the power system.

- 1.1.3 Pursuant to WESM Rules Clause 2.3.5.1, a *Trading Participant* or Network Service Provider providing ancillary services shall register with the *Market Operator*.
- 1.1.4 The *DOE*, through their Department Circular DC2015-11-0018, promulgated the implementation of the Central Scheduling and Dispatch of Energy and Contracted Reserves. It was effectively implemented in the Luzon *grid* and Visayas *grid* on 22 December 2015 and 07 October 2017, respectively.
- 1.1.5 The *DOE*, through their Department Circular DC2015-10-0015, adopted Enhancements to the *WESM* Design and Operations, which included the change from a 1-hour *dispatch interval* to a 5-minute *dispatch interval*.
- 1.1.6 The *DOE*, through their Department Circular DC2019-12-0018, defined the classification and required levels of *ancillary services (A/S)* pending the harmonization of *A/S* related issuances and review of the relevant provisions of the 2016 edition of the Philippine Grid Code (PGC 2016).

1.2 PURPOSE

- 1.2.1 Pursuant to the DOE Department Circulars, Nos. DC2014-03-0009 and DC2019-12-0018, this Protocol implements the directive for the *System Operator* and the *Market Operator* to formulate and maintain the Central Scheduling and Dispatch of Reserves Protocol. This Protocol shall be referred to as the “Protocol for Central Scheduling and Dispatch of Energy and Contracted Reserves”.
- 1.2.2 This Protocol shall be read together with the WESM Dispatch Protocol Manual. The WESM Dispatch Protocol Manual aims to define functions and responsibilities among the *Market Operator*, the *System Operator*, and WESM Members with respect to the scheduling and dispatch of *reserve capacities*.

- 1.2.3 All normal and emergency procedures defined in the WESM Dispatch Protocol Manual shall apply. This Protocol shall define specific arrangements among the *Market Operator*, *System Operator*, and *Trading Participants* for a limited period during the Central Scheduling of energy and *reserves* covered by Ancillary Services Procurement Agreement (ASPA) for WESM tradable reserve categories.
- 1.2.4 This Protocol provides for the mechanism to centrally schedule all energy and *reserve* capacities covered by Energy Regulatory Commission (ERC)-Approved ASPA in the WESM.
- 1.2.5 This Protocol shall continue to be applied upon the implementation of the 5-minute *dispatch interval* unless otherwise stated by a new directive from the *DOE*.

1.3 SCOPE

This Protocol covers specific guidelines in the scheduling and dispatch of *reserve* capacities during normal and emergency conditions during the Central Scheduling of energy and *reserves*.

- 1.3.1 This Protocol shall apply to the *Market Operator*, the *System Operator* and all *WESM Members*, including *intending WESM Members*, and *WESM Participants* in the electric power industry for a limited period and shall immediately cease upon commencement of the commercial operation of the WESM *reserve* market pursuant to the provisions of the *DOE* Department Circulars Nos. DC2014-03-0009 and DC2019-12-0018.
- 1.3.2 Pursuant to the provisions of the *DOE* Department Circulars Nos. DC2014-03-0009 and DC2019-12-0018, all scheduled ASPA Contracts shall be settled in accordance with the respective provisions of their contract and no *settlement* thereof shall be made in the WESM.

SECTION 2 DEFINITIONS, REFERENCES AND INTERPRETATION**2.1 DEFINITIONS**

- 2.1.1 *Central Scheduling* shall refer to the activities taken prior to Commercial Launch Date of the WESM Reserve Market for the purpose of central dispatch of energy and *reserve* categories traded in the WESM. It intends to reflect the entire capacities in the WESM, including the *reserve* capacities contracted by NGCP, so that these can be centrally scheduled for either energy or *reserve*. No settlement of *reserves* shall be made through the WESM, but rather these shall be settled based on the respective provisions of their ASPA.
- 2.1.2 Unless otherwise defined in Section 2 of this document or unless the context provides otherwise, all terms used in this Protocol that are defined in the *WESM Rules* shall have the meaning as so defined in the *WESM Rules* and relevant Market Manuals.
- 2.1.3 *Maximum Operating Limit* refers to the maximum MW capability that a generator can obtain for a target time or dispatch interval based on its offer capacity while considering its current state, its ramp-up capability, and over-riding constraints, if there are any.
- 2.1.4 *Minimum Operating Limit* refers to the minimum MW capability that a generator can obtain for a target time or *dispatch interval* based on its offer capacity while considering its current state, its ramp-down capability, and over-riding constraints, if there are any.

2.2 REFERENCES

- 2.2.1 This Protocol should be read together with the *WESM Dispatch Protocol Manual*, including Chapters 3 and 6 of the *WESM Rules*, whenever applicable, and the *DOE Department Circulars* Nos. DC2014-03-0009 and DC2019-12-0018.

2.3 INTERPRETATION

- 2.3.1 The rules on interpretation set out in Chapter 9 of the WESM Rules, as these may be amended from time to time, shall govern the interpretation of this Protocol.
- 2.3.2 In the event of inconsistencies, issuances of later date and those specific to Central Scheduling shall prevail over the earlier and/or general WESM Rules, WESM Market Manuals or issuances insofar as central scheduling and dispatch are concerned.

SECTION 3 RESPONSIBILITIES

3.1 MARKET OPERATOR

- 3.1.1 The *Market Operator* is responsible for the administration of the Wholesale Electricity Spot Market (WESM) in accordance with the WESM Rules. Among other functions, it is responsible for determining the energy and *reserve* schedules of all facilities in the WESM, which shall then be submitted to the *System Operator* for implementation (WESM Rules section 1.3.1).
- 3.1.2 In administering the operations of the WESM, the *Market Operator* shall carry out its functions by performing and complying with the obligations and procedures set out in this Protocol and the WESM Dispatch Protocol Manual.

3.2 SYSTEM OPERATOR

- 3.2.1 The *System Operator* shall be responsible for and shall operate the power system in accordance with the WESM Rules and applicable Market Manuals, the Grid Code and the dispatch schedule communicated by the *Market Operator*. Its primary responsibilities include providing central dispatch to all generation facilities

and loads connected, directly and indirectly, to the transmission system in accordance with the dispatch schedule submitted by the *Market Operator* (WESM Rules section 1.3.3).

3.2.2 The *System Operator* shall carry out its functions by performing and complying with the procedures and obligations set out in this Protocol and the WESM Dispatch Protocol Manual.

3.2.3 The *System Operator* shall continue to contract out A/S required capacities in accordance with DOE Department Circular No. DC2019-12-0018, and perform the monitoring, and settlement of *reserves* pursuant to each A/S provider's ASPA.

3.3 TRADING PARTICIPANTS AND WESM MEMBERS

3.3.1 All *Trading Participants* and other WESM members shall comply with the timetable and procedures for scheduling and dispatch that are set out in this Protocol and the WESM Dispatch Protocol Manual as such procedures apply to them.

3.3.2 They shall endeavor to adopt internal processes, systems and infrastructure, as well as protocols with their counterparties, to comply with this Protocol and the WESM Dispatch Protocol Manual.

3.3.3 Pursuant to WESM Rules clause 2.3.1.7, scheduled generation companies are required to operate their scheduled *generating units* in accordance with the scheduling and dispatch procedures described in Chapter 3 of the WESM Rules.

SECTION 4 CENTRAL SCHEDULING OF RESERVE CAPACITIES

4.1 RESERVE TYPES AND RESERVE REQUIREMENTS

4.1.1 Pursuant to *DOE* Department Circular DC2019-12-0018, the following *reserve* types, and its associated *reserve* requirements, shall be allocated per one-hour interval and per *grid*.

Reserve Type	Description	Reserve Requirement
<i>Regulating reserve</i>	Readily available and dispatchable generating capacity that is allocated exclusively to correct deviations from the acceptable nominal <i>frequency</i> caused by unpredicted variations in demand or generation output	4% of the total demand
<i>Contingency reserve</i>	Synchronized generation capacity from qualified <i>generating units</i> and qualified <i>interruption loads</i> allocated to cover the loss or failure of a synchronized <i>generating unit</i> or a transmission element or the power import from a circuit interconnection	Maximum capacity among the (a) largest synchronized <i>generating units</i> , (b) transmission element, or (c) power import from a circuit interconnection
<i>Dispatchable reserve</i>	Generating capacity that is not scheduled for regular energy supply, <i>regulating reserve</i> , <i>contingency reserve</i> , or <i>interruption loads</i> not scheduled for <i>contingency</i>	Maximum capacity among the (a) second largest synchronized <i>generating units</i> , (b) transmission element,

Reserve Type	Description	Reserve Requirement
	<i>reserve</i> , and that are readily available for <i>dispatch</i> in order to replenish the <i>contingency reserve</i> service whenever a <i>generating unit</i> trips or a loss of a single transmission interconnection occurs	(c) power import from a circuit interconnection

4.1.2 For *regulating reserves*, the requirement shall be:

- 4.1.2.1 Set to 2% of the demand for upward regulation, and 2% of the demand for downward regulation
- 4.1.2.2 The *System Operator* may, at its option, set different *reserve* requirement levels for upward regulation and downward regulation provided that they add up to the prescribed *regulating reserve* requirement that is stated in Section 4.1.1 of this Protocol.

4.2 USE OF DAY-AHEAD PROJECTIONS AND OVER-RIDING CONSTRAINTS

- 4.2.1 The *Market Operator* shall provide the results of the *Day-Ahead Projection*, particularly covering the one-hour intervals of the next *trading day* in accordance with the *WESM* timetable, to the *System Operator* so that it can be used for determining the *MW* levels of the *reserve* requirements for each type of *reserve* in each *grid/region*.
- 4.2.2 The *System Operator* shall submit to the *Market Operator* the level of *reserve* requirements for each type of *reserve* of each *grid/region* for a period of time, while taking into account the covered period of the *market projections* and the real-time *dispatch*, and in accordance with the *WESM* Timetable.

- 4.2.3 The *System Operator* may submit *over-riding constraints* to impose limits on the energy flow along specific *transmission lines* or branch groups to allow *reserve capacities* to be dispatched without over-loading.
- 4.2.4 At the very least, the limitation of the energy flow along specific *transmission lines* or branch groups shall allow additional energy flow equivalent to the upward regulation requirement.
- 4.2.5 The *Market Operator* shall use the Day-Ahead Ancillary Service Schedule (DAASS) provided by the *System Operator* to validate the AS schedule nominated by the *Trading Participant* and ensure that the capacities scheduled be available in the *Real-Time Dispatch* (RTD).

4.3 SUBMISSION OF GENERATION AND RESERVE OFFERS FOR MARKET PROJECTIONS

- 4.3.1 All *Trading Participants* shall submit their *generation offers* pursuant to the provisions of the *WESM Rules Appendix A1*.
- 4.3.2 *Trading Participants* with ERC-Approved ASPA shall submit *reserve offers* for the *one-hour intervals* of the next *trading day* prior to 1130H of the current *trading day*. The capacities of their *reserve offers* shall correspond to their ancillary service nominations to the *System Operator* pursuant to the provisions of their respective ASPAs.
- 4.3.3 *Trading Participants* shall submit their generation and *reserve offers* consistent with the *WESM Timetable* for the *Day-Ahead Projections* to provide a more accurate determination of *reserve requirements* as set forth in Section 4.1 of this Protocol.
- 4.3.4 The *generating unit* representation of A/S providers in the *Market Network Model* shall be consistent with the *System Operator's* model for scheduling, monitoring, dispatching, and settlement of such A/S providers.

4.4 DAY-AHEAD SCHEDULING OF RESERVES BY THE SYSTEM OPERATOR

- 4.4.1 ASPA Providers shall observe the same nomination and scheduling process prescribed in their ASPA for the day-ahead scheduling of ancillary services.
- 4.4.2 *Trading Participants* shall submit their *maximum available capacity* to the *WESM*, inclusive of *reserve offers* based on the approved day-ahead ancillary schedule.
- 4.4.3 The *System Operator* shall provide the *reserve* requirements and approved day-ahead ancillary service schedule (DAASS) to the *Market Operator* not later than 1900H.
- 4.4.4 The *System Operator* shall provide the approved DAASS to the relevant *Trading Participants* and ASPA providers not later than 1700H.
- 4.4.5 By 1900H, *Trading Participants* shall submit their updated generation and *reserve offers* for the next *trading day* to the *Market Operator*, ensuring that the *reserve offer* submitted in the *WESM* shall be consistent with their respective DAASS.
- 4.4.6 For the submission of *Regulating Reserves*, unless otherwise distinctly specified by the *System Operator*, *Trading Participants* shall submit half of its DAASS regulating reserve capacity for upward regulation, whereas the other half shall be submitted for downward regulation to the *Market Operator* through the Market Participant Interface (MPI).

4.5 SUBMISSION OF GENERATION AND RESERVE OFFERS FOR THE REAL-TIME DISPATCH (RTD)

- 4.5.1 All *Trading Participants* shall submit *generation offers* that represent their maximum available capacity pursuant to the provisions of *WESM Rules* Clause 3.5.5.2.

4.5.2 *Trading Participants* that were scheduled by the *System Operator* to provide a specific *reserve* service for a specific one-hour interval shall submit a *reserve offer* based on the following guidelines:

- (a) Only two (2) *reserve offer* break quantities shall be submitted
- (b) The first block should have a quantity (MW) of 0 MW
- (c) The second block should have a quantity equivalent to the DAASS identified in Section 4.4 of this Protocol for that relevant trading interval
- (d) The first and second price offer blocks shall be priced at PhP0.0/MWh only
- (e) For *regulating reserves*, unless otherwise distinctly specified by the *System Operator*, *Trading Participants* shall submit half of its DAASS capacity for upward regulation, whereas the other half shall be submitted for downward regulation.

4.5.3 All *Trading Participants* shall observe the “Open Market Window” in submitting *generation* and *reserve offers* as stated in the *WESM* Dispatch Protocol Manual.

4.6 REVISION IN THE RESERVE REQUIREMENTS AND RE-NOMINATION OF RESERVE CAPACITIES

4.6.1 The *System Operator* may update the *reserve* requirements at any time, as may be necessary.

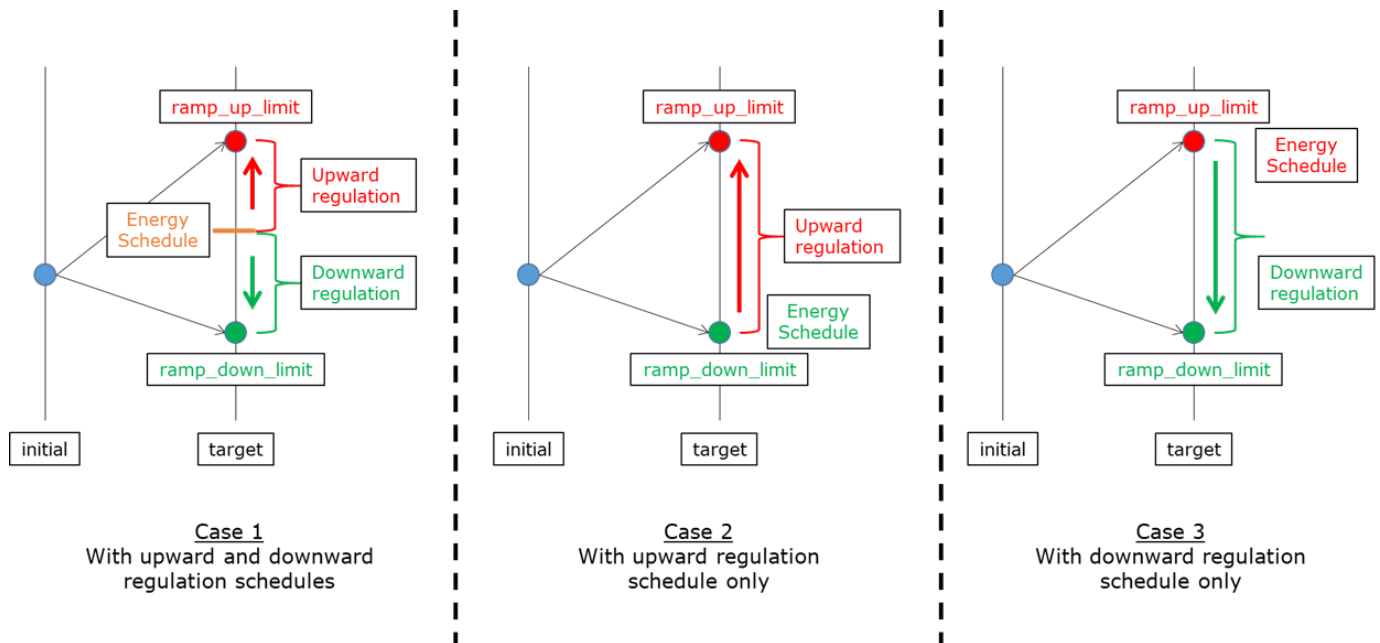
4.6.2 All ASPA providers may re-nominate capacities for *reserve* during the actual day of implementation subject to the AS Guidelines on re-nomination and approval process set forth by the *System Operator*.

4.6.3 Should an ASPA provider’s re-nominated capacity be approved by the *System Operator*, the ASPA provider shall update its *generation* and *reserve offer* in the *WESM* for the relevant one-hour intervals while observing the “Open Market Window” as stated in the *WESM* Dispatch Protocol Manual.

4.7 REAL-TIME DISPATCH SCHEDULING AND DISPATCH IMPLEMENTATION

- 4.7.1 *Generating units* shall obtain *reserve* schedules based on the submitted *reserve offers* in accordance with Sections 4.5 and 4.6 of this Protocol with the objective of satisfying the *reserve* requirements by the *System Operator*.
- 4.7.2 If there is an insufficiency in the generation capacities to meet the *energy* and *reserve* requirements, the Market Management System shall schedule *energy* and *reserve* capacities based on the order of priority set in the *WESM* Manual on Constraint Violation Coefficients and Pricing Re-Runs.
- 4.7.3 If there is a thermal or an N-1 contingency constraint, the Market Management System shall schedule a generator's capacity to be scheduled for *energy* instead of being allocated for *reserve* service based on the order of priority set in the *WESM* Manual on Constraint Violation Coefficients and Pricing Re-Runs.
- 4.7.4 *Trading Participants* shall ensure that their generators are at the appropriate *loading levels* prior to the *trading intervals* where it is expected to provide *reserve* service. This is to ensure that they obtain their intended *energy* and *reserve* schedules for the Real-Time *Dispatch* (RTD) considering their ramping characteristics.
- 4.7.5 The Market Management System shall consider ramping constraints for upward and downward regulation services. The following equations show the constraints for energy and regulation schedules while considering ramping limitations:
- 4.7.5.1 $[\text{Energy}] - [\text{Downward regulation}] \geq [\text{ramp_down_limit}]$
- 4.7.5.2 $[\text{Energy}] + [\text{Upward regulation}] \leq [\text{ramp_up_limit}]$

4.7.6 With respect to the constraints shown in Section 4.7.5 of this Protocol, the following illustration shows the different cases of the joint ramping of energy and regulation (upward and downward).



4.7.7 The *System Operator* may constrain-on or constrain-off the output of *generating unit/s* in accordance with the WESM Merit Order Table (WMOT) and may designate must-run units (MRUs) in real-time if all available ancillary *reserve* capacity has been exhausted or depleted.

4.7.8 For generators that were scheduled below their respective technical Pmin for the next trading interval:

4.7.8.1 *Trading Participants* shall manage their offers appropriately for the following intervals so that such an incident may not recur.

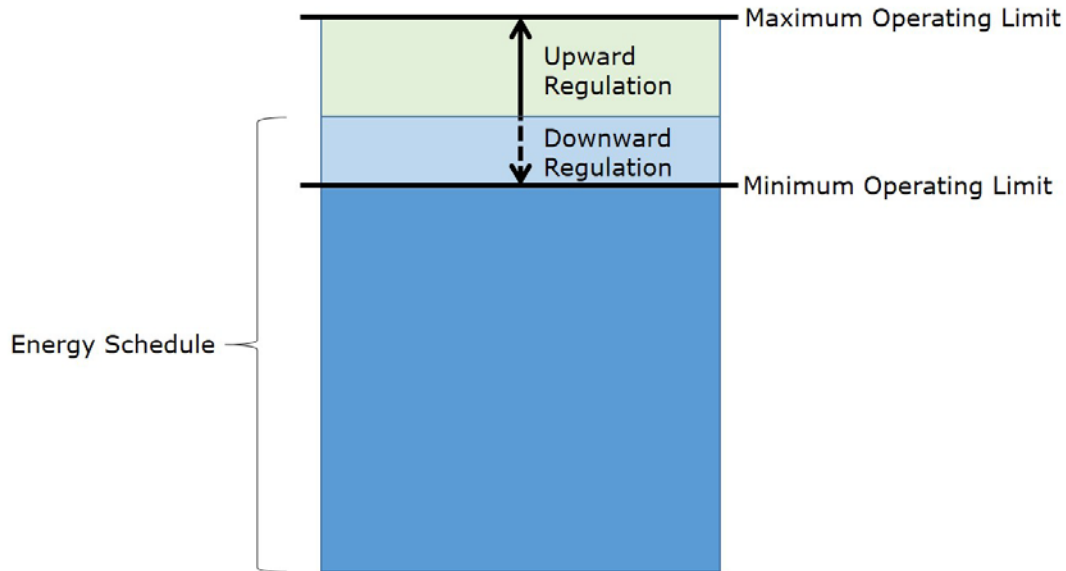
- 4.7.8.2 If it is currently running or dispatched, then it should operate at its technical Pmin for that next trading interval.
- 4.7.8.3 If a generator is scheduled below its technical Pmin for the next trading interval, and it is currently off-line, then it should remain off-line for that next trading interval.
- 4.7.9 WESM Rules Clause 3.8.4 states that *Trading Participants* who are dispatched shall use reasonable endeavors to achieve a linear ramp rate over the trading interval to reach the target loading level by the end of that trading interval and within the dispatch tolerances specified in WESM Rules Clause 3.8.7. *Trading Participants* will not be required to operate in a different fashion unless it is necessary to:
 - (a) Respond in accordance with *reserve* or ancillary service contracts; or
 - (b) Respond to a direction in accordance with WESM Rules Clauses 6.3 and 6.5.

4.8 ISSUANCE OF PRICING ERROR NOTICES

- 4.8.1 Should the scheduling of contracted *reserve* capacities in the WESM affect the scheduling and pricing of energy capacities, the *Market Operator* may issue pricing error notice for the affected trading interval.
- 4.8.2 The *Market Operator* shall issue pricing errors and conduct market re-runs following existing guidelines and procedures.

SECTION 5 SETTLEMENT OF RESERVE CAPACITIES**5.1 SETTLEMENT OF RESERVE CAPACITIES**

- 5.1.1 All *reserve* transactions shall be settled based on their Ancillary Service Procurement Agreement (ASPA).
- 5.1.2 If a generator that offered its day-ahead ancillary schedule in the *WESM* is utilized as energy based on either the RTD schedules or on its actual utilization, then it shall be treated as an ancillary service with energy by NGCP for their ASPA settlement.
- 5.1.3 The energy schedule obtained by an ASPA provider while being scheduled for downward regulation in the RTD because of the head-room constraint in the *Market Dispatch Optimization Model* (MDOM) shall also be considered. The head-room constraint is imposed in the MDOM so that the energy and *regulating reserve* schedules are set in a manner that the downward and upward dispatch of the *regulating reserve* will not violate the minimum and maximum operating limits of a generator.



Head-room Constraints

$$\text{Energy} - \text{Downward Regulation} \geq \text{Minimum Operating Limit}$$

$$\text{Energy} + \text{Upward Regulation} \leq \text{Maximum Operating Limit}$$

5.1.4 No spot transactions on *reserve* shall be settled in the *WESM* during the Central Scheduling of energy and *reserves*.

5.2 OTHER SUBMISSION REQUIREMENTS

5.2.1 The *Market Operator* shall submit to the *System Operator* the RTD energy and *reserve* schedules, and the capacities submitted for *generation* and *reserve offers* used in the RTD run, not later than 1200H of the following day.

5.2.2 Every Monday, the *System Operator* shall submit the final list of *reserve* schedules for the past week (Monday to Sunday) considering the possible revisions for the actual hour in consideration of Section 4.6 of this Protocol.

- 5.2.3 Not later than the 5th of the month, the *System Operator* shall submit to the *Market Operator* the A/S incidental energy of each A/S provider for each *dispatch interval* during the recently completed *billing period* (e.g., On 05 February 2020, A/S incidental energy shall be submitted by the *System Operator* for the *billing period* of January 2020).
- 5.2.4 The *Market Operator* shall coordinate with the *System Operator* on the validation of the accuracy of the A/S incidental energy provided in Section 5.2.3 of this Protocol. The completion of the validation between the *Market Operator* and *System Operator* shall be completed not later than the 15th of the month for the recently completed *billing period*.
- 5.2.5 Not later than the 18th of the month, the *Market Operator* shall submit to the *System Operator* the *WESM Trading Amount*, including the RTD schedules and *metered quantities*, of each A/S provider for the *dispatch intervals* when the A/S provider had a *reserve schedule* for the recently completed *billing period*.

SECTION 6 A/S PENALTY

The *System Operator* shall consider the data submitted by the *Market Operator* in Section 5.2.1 when applying penalties to A/S providers in accordance with their ASPA.

SECTION 7 PERFORMANCE STANDARDS

The *Market Operator* and the *System Operator* shall endeavor to adopt measures and perform its obligations under this Protocol in accordance with comparable industry standards of due diligence. Nothing herein shall make the *Market Operator* and the *System Operator*, its employees, officers and board members liable for any actual or compensatory damages arising from the implementation of this Protocol in the absence of willful negligence or bad faith. The *Market Operator* and the *System Operator* shall in its reasonable opinion implement remedial measures in order to manage and mitigate

any errors in the MMS arising from erroneous inputs, system failures or other related circumstances.

SECTION 8 MODIFICATIONS AND EFFECTIVITY
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In accordance with *DOE* Department Circulars Nos. DC2014-03-009 and DC2019-12-0018, this Protocol shall be in effect upon approval by the *Department of Energy* and shall terminate upon commercial operation of the WESM *Reserve Market* or upon declaration of its cessation by the *DOE*.

The *DOE* may, in its discretion, revise Sections of this Protocol as the circumstances may require in consultation with *Trading Participants*.